

No.

200700334



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Ball Horticultural Company

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE FOREGOING PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

ZINNIA

'PAS490444'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this twenty-fifth day of November, in the year two thousand and eight.

Attest:

Blair Zuer
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Edmund V. Schaefer
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER Ball Horticultural Company		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME PAS White F8528M		3. VARIETY NAME 'PAS490444'	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) 622 Town Road West Chicago, IL 60185 USA		5. TELEPHONE (include area code) (630) 588-3118		FOR OFFICIAL USE ONLY PVPO NUMBER #200700334 FILING DATE May 25, 2007	
		6. FAX (include area code) (630) 562-7671			
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Corporation		8. IF INCORPORATED, GIVE STATE OF INCORPORATION IL		9. DATE OF INCORPORATION July 27, 1995	
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Audrey Charles 622 Town Road West Chicago, IL 60185 USA				F E E S R E C E I V E D FILING AND EXAMINATION FEES: \$ 4382.00 DATE 5/25/07 CERTIFICATION FEE: \$ 768.00 DATE 10-06-2008	
11. TELEPHONE (Include area code) (630) 588-3118		12. FAX (Include area code) (630) 562-7671		13. E-MAIL acharles@ballhelix.com	
14. CROP KIND (Common Name) zinnia		15. FAMILY NAME (Botanical) Asteraceae		18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (OPTIONAL) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERCIALIZATION.	
15. GENUS AND SPECIES NAME OF CROP Zinnia marylandica		17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Exhibit F. Declaration Regarding Deposit g. <input checked="" type="checkbox"/> Voucher Sample (3,000 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) h. <input checked="" type="checkbox"/> Filing and Examination Fee (\$4,382), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)				20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act) <input type="checkbox"/> YES (If "yes", answer items 21 and 22 below) <input checked="" type="checkbox"/> NO (If "no", go to item 23) 21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? <input type="checkbox"/> YES <input type="checkbox"/> NO IF YES, WHICH CLASSES? <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED 22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> YES <input type="checkbox"/> NO IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS. <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED (If additional explanation is necessary, please use the space indicated on the reverse.)	
23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)				24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)	
25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF OWNER Audrey Charles		SIGNATURE OF OWNER			
NAME (Please print or type) Audrey Charles		NAME (Please print or type)			
CAPACITY OR TITLE Patent Agent		DATE May 22, 2007		CAPACITY OR TITLE DATE	

GENERAL INSTRUCTIONS: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E, F; (3) for a tuber reproduced variety, verification that a viable (*in the sense that it will reproduce an entire plant*) tissue culture will be deposited and maintained in an approved public repository; and (4) payment by credit card or check drawn on a U.S. bank for \$4,382 (\$518 filing fee and \$3,864 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice). **NEW:** With the application for a seed reproduced variety or by direct deposit soon after filing, the applicant must provide at least 3,000 viable untreated seeds of the variety *per se*, and for a hybrid variety at least 3,000 untreated seeds of each line necessary to reproduce the variety. Partial applications will be held in the PVPO for not more than 90 days; then returned to the applicant as un-filed. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. **Retain one copy for your files.** All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a payment by credit card or check payable to "Treasurer of the United States" in the amount of \$768 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

Plant Variety Protection Office
Telephone: (301) 504-5518 **FAX:** (301) 504-5291
General E-mail: PVPOmail@usda.gov
Homepage: <http://www.ams.usda.gov/science/pvpo/PVPindex.htm>

SPECIFIC INSTRUCTIONS:

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and **provide evidence** that the permanent name of the application variety (even if it is a parental, inbred line) has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: U.S. Department of Agriculture, Agricultural Marketing Service, Livestock and Seed Programs, **Seed Regulatory and Testing Branch**, 801 Summit Crossing Place, Suite C, Gastonia, North Carolina 28054-2193 Telephone: (704) 810-8870. <http://www.ams.usda.gov/lsg/seed.htm>.

ITEM

- 19a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) evidence of uniformity and stability; and (4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
- (1) identify these varieties and state all differences objectively;
 - (2) attach replicated statistical data for characters expressed numerically and demonstrate that these are clear differences; and
 - (3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
20. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See Regulations and Rules of Practice, Section 97.103).
23. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
24. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

22. CONTINUED FROM FRONT (Please provide a statement as to the limitation and sequence of generations that may be certified.)

23. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

24. CONTINUED FROM FRONT (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

EXHIBIT A*Breeding History of the Zinnia marylandica Variety 'PAS490444'*

The zinnia species *Zinnia marylandica* is an amphidiploid produced by colchicine-induced doubling of sterile interspecific hybrids of *Zinnia angustifolia* and *Zinnia violaceae* [see in Exhibit D, Spooner, D.M., D.P. Stimart and T.H. Boyle. 1991. *Zinnia marylandica* (Asteraceae: Heliantheae), a new disease-resistant ornamental hybrid. *Brittonia* 43:7-10].

In 2000 the *Z. marylandica* variety 'Pinwheel Yellow' (Ball Horticultural Company) was used as the female in a cross with the *Z. marylandica* variety 'Profusion White' (also referred to as *Zinnia hybrida*, PVPO 9800350, Sakata Seed Corporation). Seed of the resultant F₁ hybrid ZM00762 was sown in the spring of 2001. Three of these F₁ plants were chosen at random and self-pollinated. The F₁ selections were labeled ZM00762-1, ZM00762-2, and ZM00762-3. From each plant F₂ seed was harvested separately in the fall of 2001.

The F₂ seed from all three F₁ selections was sown separately in the spring of 2002. Among the resultant F₂ plants from line ZM00762-2, four selections were made, mainly for large flowers, and those plants were self-pollinated. F₃ seed was harvested separately from each selection in the fall of 2002.

In 2003 and 2004 three F₃ and three F₄ single plant selections were made, respectively, using the same criteria as in the F₂ as well as selection for germination, uniform white color, and uniformity of habit.

The F₅ seed from all three F₄ selections was sown in the spring of 2005. It was determined that line ZM00762-2-5-2-1 had uniformly large, white flowers, a uniform habit, and germinated and yielded well. Open-pollinated F₆ seed was produced from 69 plants of this line. The line was now labeled F8528M with the pedigree ZM00762-2-5-2-1-m05. The F₆ seed was harvested in September 2005.

The F₆ seed was sown in November 2005 and open-pollinated F₇ seed was harvested from 3670 plants in March of 2006. In April 2006 both the F₆ and F₇ seed produced through open pollination as well as remnant F₅ breeder's seed were sown in trials. F8528M was shown to be both uniform for all characters (e.g. flower size, color, plant habit, flowering date), as well as stable across these three generations. F8528M was then assigned the variety name 'PAS490444'.

Variants appear in 'PAS490444' at a frequency of about 1.5 percent. These variants have lengthened internodes but are identical to the variety in all other characteristics as described in Exhibit C. These variants are known to be the result of spontaneous mutation due to aneuploidy. This type of mutation occurs in most, if not all, *Zinnia marylandica* varieties and is a characteristic of the species. These variants are commercially acceptable and predictable.

EXHIBIT B*Statement of Distinctness of the Zinnia marylandica Variety 'PAS490444'*

'PAS490444' is most readily distinguished from 'Profusion White', which is the most similar commercial variety available, by flower diameter.

The flower diameter of 'PAS490444' compared to 'Profusion White' is shown in Table 1 and Figure 1 below. Greenhouse trials were conducted in two locations: Santa Paula, California and Elburn, Illinois. For analysis, the diameters of the first fully open flower from twelve plants of each variety were measured. In both trials, 'PAS490444' was found to have significantly larger flower diameter than the comparison 'Profusion White'.

Table 1. Flower diameter of 'PAS490444' compared to 'Profusion White'.

Trial	'PAS490444' Average Flower Diameter (cm)	'Profusion White' Average Flower Diameter (cm)	Sample Size Each Variety	t Critical $\alpha=.05$	t Statistic	P Value
Santa Paula	7.1 +/- 0.2	6.3 +/- 0.4	12	2.1	5.5	1.6E-05
Elburn	6.1 +/- 0.2	5.0 +/- 0.8	12	2.1	4.5	1.9E-04

In addition, please see Figure 1 in Exhibit C, Comments Section #14.



Figure 1. Comparison of flower size showing larger flowers of 'PAS490444', labeled with temporary designation number PAS White F8528M, (top) compared to smaller flowers of 'Profusion White' (bottom).

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The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

Exhibit C

OBJECTIVE DESCRIPTION OF VARIETY
Zinnia (Zinnia spp.)

NAME OF APPLICANT (S) Ball Horticultural Company	TEMPORARY OR EXPERIMENTAL DESIGNATION PAS White F8528M	VARIETY NAME 'PAS490444'
ADDRESS (Street and No. or RD No., City, State, Zip Code and Country) 622 Town Road West Chicago, IL 60185 USA		FOR OFFICIAL USE ONLY PVPO NUMBER #200700334

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

In the spaces on the left, enter the appropriate numbers that describe the characteristics of the application variety. On the right, enter the appropriate numbers that describe the characteristics of the most similar comparison variety. Right justify whole numbers by adding leading zeros if necessary. The variety that you choose for comparison should be the most similar one in terms of overall morphology, background and maturity. The comparison variety should be grown in field trials with the application variety for 2-3 location/years (environments) in the region and season of best adaptability. At least one year of trials should be conducted within the United States of America. In general, measurements of quantitative traits should be taken from one trial on 15-25 randomly selected plants or plant parts to obtain averages and statistics that describe a typical field of the variety. (Form technical content last updated August 1978.)

Application Variety Data	Comparison Variety Data
1. SPECIES: 4 Species: 1 = <i>Z. elegans</i> 2 = <i>Z. linearis</i> 3 = <i>Z. hageana (angustifolia)</i> 4 = Species Cross <i>Z. angustifolia</i> x <i>Z. violaceae</i> (formerly <i>Z. elegans</i>)	Comparison Variety Name <u>Profusion White</u> 4 Species
2. PLOIDY 1 Ploidy: 1 = Diploid (24) 2 = Tetraploid (48) 3 = Other (Specify) _____	1 Ploidy
3. FLOWER TYPE 4 Type: 1 = Button (Cherry Buttons, Thumbelina) 2 = Pompon (Scarlet Gem, White Gem) 3 = Dahlia (Dream, Exquisite) 4 = Crested, Scabiosa (Wind Witch) 5 = Cactus (Blaze, Sunny Boy) 6 = Mexican (Old Mexico)	4 Type
4. PLANT 6 1 Days from Emergence to First Flower 2 Season: 1 = Short, Concentrated Flowering 2 = Long, Continuous Flowering 1 0 No. of Primary Branches 1 4 No. of Secondary Branches 0 5 No. of Tertiary Branches Main Stalk: 0 5 No. of Internodes on Main Stalk 0 5 mm Length of Internodes Between First and Second Nodes 0 5 mm Diameter Between First and Second Nodes	6 0 Days to First Flower 2 Season 1 1 No. of Primary Branches 1 9 No. of Secondary Branches 1 0 No. of Tertiary Branches Main Stalk: 0 5 No. of Internodes on Main Stalk 0 5 mm Length of Internodes 0 6 mm Diameter
Application Variety Data	Comparison Variety Data

Application Variety Data	Comparison Variety Data
<p>4. PLANT, Main Stem:(cont.)</p> <p><u>1</u> Habit: 1 = Compact 2 = Spreading</p> <p><u>2</u> <u>2</u> cm Wide</p> <p><u>2</u> <u>5</u> cm High</p> <p><u>3</u> Pubescence: 1 = Glabrous 2 = Sparsely Pubescent 3 = Pubescent</p>	<p><u>1</u> Habit</p> <p><u>2</u> <u>1</u> cm Wide</p> <p><u>2</u> <u>0</u> cm High</p> <p><u>3</u> Pubescence</p>
<p>5. LEAF</p> <p><u>1</u> Leaf Shape: 1 = Lanceolate 2 = Ovate 3 = Elliptic</p> <p><u>0</u> <u>3</u> <u>1</u> mm Wide</p> <p><u>1</u> <u>0</u> <u>4</u> mm Long</p> <p><u>2</u> Dorsal Surface Pubescence: 1 = Glabrous 2 = Pubescent</p> <p><u>2</u> Ventral Surface Pubescence: 1 = Glabrous 2 = Pubescent</p>	<p><u>1</u> Leaf Shape</p> <p><u>0</u> <u>3</u> <u>3</u> mm Wide</p> <p><u>0</u> <u>9</u> <u>9</u> mm Long</p> <p><u>2</u> Dorsal Surface Pubescence</p> <p><u>2</u> Ventral Surface Pubescence</p>
<p>6. FLOWERS</p> <p><u>0</u> <u>7</u> cm Length of Cut Flower (From head to first branch)</p> <p><u>1</u> <u>9</u> Average No. Flowers per Plant</p> <p><u>0</u> <u>6</u> cm Diameter of Head</p> <p><u>1</u> Stem Rigidity: 1 = Rigid 2 = Flexible</p> <p><u>2</u> Stem Brittleness: 1 = Brittle 2 = Wirey</p> <p><u>1</u> Doubleness: 1 = Single (<i>one row of rays</i>) 2 = Semi-single (<i>several rows of rays</i>) 3 = Semi-double (<i>many rows of rays</i>) 4 = Double (<i>all rays</i>)</p>	<p><u>0</u> <u>6</u> cm Length of Cut Flower</p> <p><u>2</u> <u>9</u> Average No. Flowers per Plant</p> <p><u>0</u> <u>5</u> cm Diameter of Head</p> <p><u>1</u> Stem Rigidity</p> <p><u>2</u> Stems Brittleness</p> <p><u>1</u> Doubleness</p>
<p>7. RAY PETALS</p> <p><u>1</u> Shape 1 = Flat 2 = Twisted 3 = Curled 4 = Shaggy 5 = Quilled 6 = Combination or Other (Specify) _____</p> <p><u>1</u> Dorsal Surface Pubescence: 1 = Glabrous 2 = Pubescent</p> <p><u>2</u> Ventral Surface Pubescence: 1 = Glabrous 2 = Pubescent</p> <p><u>1</u> Dorsal Surface Luster: 1 = Dull 2 = Shiny</p> <p><u>1</u> Ventral Surface Luster: 1 = Dull 2 = Shiny</p> <p><u>2</u> Apices Shape: 1 = Acute 2 = Obtuse</p> <p><u>2</u> Apices Margin: 1 = Entire 2 = Notched 3 = Spined</p>	<p><u>1</u> Shape</p> <p><u>1</u> Dorsal Surface Pubescence</p> <p><u>2</u> Ventral Surface Pubescence</p> <p><u>1</u> Dorsal Surface Luster</p> <p><u>1</u> Ventral Surface Luster</p> <p><u>2</u> Apices Shape</p> <p><u>1</u> Apices Margin</p>
Application Variety Data	Comparison Variety Data

Application Variety Data

Comparison Variety Data

8. COLOR OF RAYS: Select from colors below. Consider only the predominant colors. Select two color codes when necessary, i.e. Whitish-Orange) 01 06
(See References below.)

01 = White 02 = Cream 03 = Pink 04 = Rose 05 = Red 06 = Orange 07 = Gold 08 = Bronze
09 = Yellow 10 = Green 11 = Lavender 12 = Scarlet 13 = Salmon 14 = Other (Specify) _____

Color Chart Name RHS Colour Chart0 1 MonocolorColor Chart Value 155A

Patterns for Bicolor or Multicolor:

 Apex Half Dorsal Side Color Chart Value _____ Apex Half Ventral Side Color Chart Value _____ Base Half Dorsal Side Color Chart Value _____ Base Half Ventral Side Color Chart Value _____ Background Dorsal Side Color Chart Value _____ Background Ventral Side Color Chart Value _____ Streaks Dorsal Side Color Chart Value _____ 1 0 Streaks Ventral Side Color Chart Value 143C Stripes Dorsal Side Color Chart Value _____ Stripes Ventral Side Color Chart Value _____ Spots Dorsal Side Color Chart Value _____ Spots Ventral Side Color Chart Value _____ Blotches Dorsal Side Color Chart Value _____ Blotches Ventral Side Color Chart Value _____ Other Dorsal Side Color Chart Value _____
Describe _____ Other Ventral Side Color Chart Value _____
Describe _____

Color Location Color Chart Value

 0 1 Monocolor 155A

Patterns for Bicolor or Multicolor:

 Apex Half Dorsal Side _____ Apex Half Ventral Side _____ Base Half Dorsal Side _____ Base Half Ventral Side _____ Background Dorsal Side _____ Background Ventral Side _____ Streaks Dorsal Side _____ 1 0 Streaks Ventral Side 143C Stripes Dorsal Side _____ Stripes Ventral Side _____ Spots Dorsal Side _____ Spots Ventral Side _____ Blotches Dorsal Side _____ Blotches Ventral Side _____ Other Dorsal Side _____
Describe _____ Other Ventral Side _____
Describe _____

9. DISK FLORETS

3 Presence: 1 = Absent 2 = Present, Covered 3 = Present, Conspicuous1 Type: 1 = Not Quilled 2 = Quilled0 6 Color (Choose from Colors in No. 8 Above)Color Chart Name RHS Color Chart Code 17A3 Presence1 Type0 6 ColorColor Chart Code 21C

10. ANTHOCYANIN (1 = Absent, 2 = Present)

1 Seedlings1 Stems1 Leaves1 Flowers1 Seedlings1 Stems1 Leaves1 Flowers

Application Variety Data	Comparison Variety Data
11. SEEDS: 3 Yield: 1 = None 2 = Poor 3 = Fair 4 = Good 0 6 mm Long 0 3 mm Wide Greyed-green Color: 1 = Tan 2 = Light Brown 3 = Dark Brown Color Chart Name <u>RHS</u> Color Chart Code <u>198A</u> 1 9 0 mg Per 100 Seeds	4 Yield 0 5 mm Long 0 3 mm Wide Color <u>Dark grey</u> Color Chart Code <u>202B</u> 2 0 0 mg Per 100 Seeds
DRIED RECEPTICLE (After Seed Removal): 4 Shape: 1 = Flat 2 = Dome 3 = Globe 4 = Cone 0 5 mm Length 0 3 mm Diameter at Base	4 Shape 0 4 mm Length 0 3 mm Diameter at Base
13. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant) 0 Powdery Mildew 0 Mosaic 0 Fusarium Wilt 0 Alternaria Leaf Spot	0 Powdery Mildew 0 Mosaic 0 Fusarium Wilt 0 Alternaria Leaf Spot

14. Comments: Attach ONE photographic print of the application variety and the comparison variety described above, indicating the identity of each variety. This photograph should show flower heads of each variety at a magnification sufficient to identify most of the verbal descriptors given above. (Additional photographs in support of this application may be supplied as part of the Exhibits B or D.)

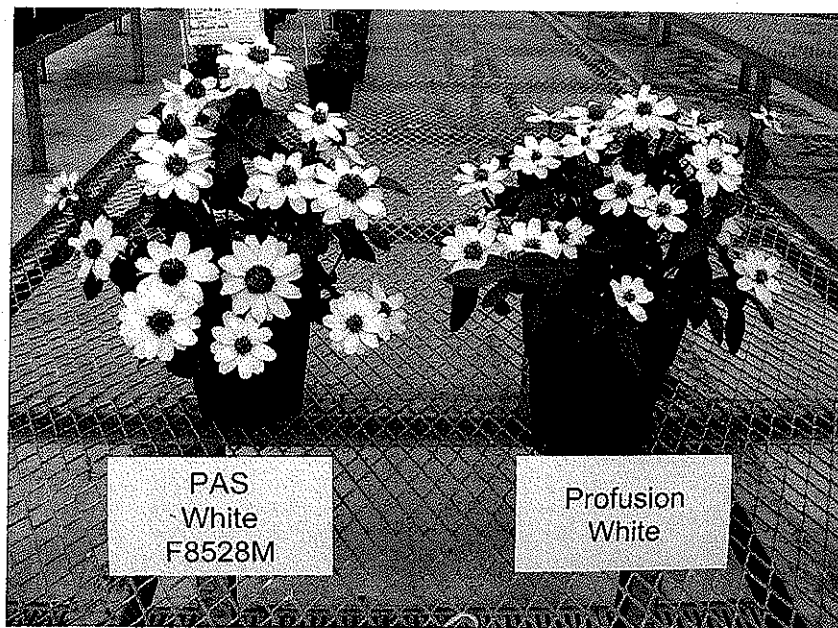


Figure 1. Comparison of Zinnia 'PAS490444', labeled with temporary designation number PAS White F8528M (left), with Zinnia 'Profusion White' (right). Flowers of 'PAS490444' are larger than those of 'Profusion White' as detailed in Exhibit B.

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COLOR: Munsell Book of Color, Royal Horticultural Society Colour Chart, Nickerson's or any recognized color fan may be used to determine the color of the variety.

Brittonia, 43(1), 1991, pp. 7-10.

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ZINNIA MARYLANDICA (ASTERACEAE: HELIANTHEAE), A NEW DISEASE-RESISTANT ORNAMENTAL HYBRID

DAVID M. SPOONER, DENNIS P. STIMART, AND THOMAS H. BOYLE

Spooner, David M. (Vegetable Crops Research Unit, Agricultural Research Service, USDA, Department of Horticulture, University of Wisconsin, Madison, WI 53706), Dennis P. Stimart (Department of Horticulture, University of Wisconsin, Madison, WI 53706), and Thomas H. Boyle (Department of Plant and Soil Science, University of Massachusetts, Amherst, MA 01003). *Zinnia marylandica* (Asteraceae: Heliantheae), a new disease-resistant ornamental hybrid. *Brittonia* 43: 7-10. 1991. — *Zinnia marylandica*, an artificial hybrid between *Z. angustifolia* var. *angustifolia* ($2n = 22$, female) and *Z. violacea* ($2n = 24$, male), is described and illustrated. *Zinnia marylandica* is a stabilized amphiploid ($2n = 46$) produced by colchicine-induced doubling of the sterile interspecific hybrids. It exhibits disease resistance to powdery mildew (*Erysiphe cichoracearum*), alternaria blight (*Alternaria zinniae*), and bacterial leaf and flower spot (*Xanthomonas campestris* pv. *zinniae*).

The genus *Zinnia* L. (Asteraceae: Heliantheae) comprises approximately 11 species of annual or perennial herbs or low shrubs, all endemic to the western hemisphere and largely restricted to Mexico (McVaugh, 1984; Torres, 1963). *Zinnia violacea* Cav. [including *Z. elegans* Jacq. (McVaugh, 1984)] is the most widely cultivated species and is prized among garden ornamentals for its large, showy inflorescences and diversity of ray floret colors and petal forms. Plants are erect, 9-100 cm in height, sparsely-branched, with large, ovate to lanceolate leaves; and cultivated forms have one to several whorls of ray florets. The chromosome number is $n = 12$ (Torres, 1963; Terry-Lewandowski et al., 1984).

A second species, *Z. angustifolia* H.B.K. var. *angustifolia*, is less extensively cultivated and is morphologically distinct from *Z. violacea*. Plants are semi-decumbent, 20-40 cm in height, profusely branched, with linear to oblong-elliptic leaves and masses of small flowers with a single whorl of orange or white ray florets (Torres, 1963). The chromosome number is $n = 11$ (Olorode, 1970; Terry-Lewandowski et al., 1984).

Although *Z. violacea* is popular as a bedding plant and cut flower, the species is prone to attack by several pathogens. In the United States, three pathogens in particular incite moderate to severe epiphytotic within *Z. violacea* plantings: *Erysiphe cichoracearum* DC. ex Merat causing powdery mildew (Baker & Locke, 1946; Morrison, 1960; Andersen, 1971), *Alternaria zinniae* Pape causing alternaria blight (Dimock & Osborn, 1943; Baker & Davis, 1950; Lipschutz, 1965), and *Xanthomonas campestris* pv. *zinniae* Hopkins & Dowson causing bacterial leaf and flower spot (Sleesman et al., 1973; Strider, 1976). Powdery mildew is the most serious disease of *Zinnia* in the United States, and susceptibility of *Z. violacea* cultivars to powdery mildew appears to be a major contributing factor to declining sales of zinnia seed (L. Drewlow, pers. comm.). *Zinnia angustifolia* is highly resistant or immune to all three pathogens and therefore represents a valuable germplasm source for genetic manipulations (Andersen, 1971; Jones & Strider, 1979; Lipschutz, 1965).

Studies were initiated at the University of Maryland in 1979 to determine if interspecific hybridization between *Z. angustifolia* and *Z. violacea* could be achieved, with the primary goal of developing disease-resistant hybrids with unique flower colors and plant habits. Although interspecific hybrids were obtained from reciprocal crosses, hybridization was more successful when *Z. angustifolia* was the maternal parent (Boyle & Stimart, 1982). Embryo abortion, poor seed ger-

mination, and abnormal plant development among some hybrids acted as post-zygotic barriers to interspecific hybridization (Boyle et al., 1987).

Cytological examinations of interspecific hybrids indicated a somatic chromosome number of $2n = 23$ (Terry-Lewandowski et al., 1984), and all plants were sterile. Lagging univalents and an irregular distribution of chromosomes were major factors contributing to hybrid sterility. Partial fertility was restored by treatment of axillary buds with aqueous colchicine (Boyle & Stimart, 1982; Terry-Lewandowski et al., 1984). The colchicine-induced amphiploids ($2n = 46$) formed predominantly bivalents at metaphase I due to suppression of pairing between homologous chromosomes. As a consequence, these segmental allopolyploids performed both cytologically and genetically as diploids and bred true from seed with little or no segregation in later generations (Terry-Lewandowski et al., 1984). We name this hybrid species after the University of Maryland, the institution where hybridization and genetic studies were initiated. Cross-combinations that produced this hybrid are found in Boyle & Stimart (1982):

Zinnia marylandica D. M. Spooner, D. P. Stimart & T. H. Boyle, sp. nov. (Fig. 1)

Plantae inter *Z. angustifolia* H.B.K. var. *angustifolia* ($2n = 22$) et *Z. violacea* ($2n = 24$) Cav. hybridae, ut *Z. violacea* e basi ramosissimae, statura inter parentes intermediae, chromosomatum numerus = 46.

Annual herb. Stems 35–55 cm tall, 0.7–1.3 cm diam, highly branched at base and overall shape of plant hemispherical or urn-shaped, brown to greenish-yellow, pubescent. Leaves sessile to subsessile; blades 5–12 cm long, 1.5–4.5 cm wide, lanceolate to ovate to oblanceolate; scabrous and sessile, glandular ad- and abaxially; base cuneate; apex acute to acuminate; margins entire. Capitulescences solitary; peduncles 1–10 cm long, 1–3 mm diam, tomentose. Heads radiate, 15–20 mm long, 40–60 mm diam across extended rays. Involucre campanulate, 9–10 mm long, 18–22 mm diam, phyllaries imbricate, 20–32, 4-seriate, reflexed apically, light green to yellow or brown, dark brown and erose at the apex, glabrous to glandular-tomentose; outer phyllaries broadly obovate, 6–8.5 mm long, 5–8 mm wide; inner phyllaries obovate, 10–12 mm long, 4–6 mm wide. Pales conduplicate, 10–14 mm long, 2–2.2 mm wide, stramineous, glabrous except strigose on keel, acute to erose at apex. Ray florets 13–17; pistillate and fertile, persistent on the achenes, ligules creamy white to yellow to red-orange adaxially, greenish-yellow abaxially; 15–28 mm long, 8–15 mm wide; achenes 4–7.5 mm long, 2.5–3.2 mm wide, oblanceolate, 3-angled, strigose, margins ciliate, tuberculate when mature. Disc florets 120–150, corollas yellow to red-orange, 10–11 mm long, 1–1.3 mm diam; lobes 2–4.5 mm long, 0.5–0.8 mm wide; achenes 5–7 mm long, 2.8–3.2 mm wide, obovate, laterally flattened, strigose, ciliate at margins, black, brown or black-brown mottled or with whitish longitudinal lines; pappus of 1 or 2 persistent awns to 4.5 mm long.

TYPE: U.S.A.: Cultivated amphiploid plant grown at the University of Wisconsin-Madison, resulting from crosses between *Zinnia angustifolia* H.B.K. var. *angustifolia* and *Z. violacea* Cav., 28 Aug 1988, *Stimart 1* (HOLOTYPE: WIS; ISOTYPES: MARY, OS).

Early hybridization attempts between *Z. angustifolia* and *Z. violacea* utilized an orange-flowered cultivar of *Z. angustifolia* (Boyle & Stimart, 1982). Interspecific hybrids from these crosses did not express the diversity in ray floret color found among the *Z. violacea* cultivars used as pollen parents. Instead, hybrids displayed orange, scarlet, or yellow ray florets, i.e., colors more closely resembling the *Z. angustifolia* parent. A white-flowered cultivar of *Z. angustifolia* was used in later hybridization attempts and resulted in interspecific hybrids with white,

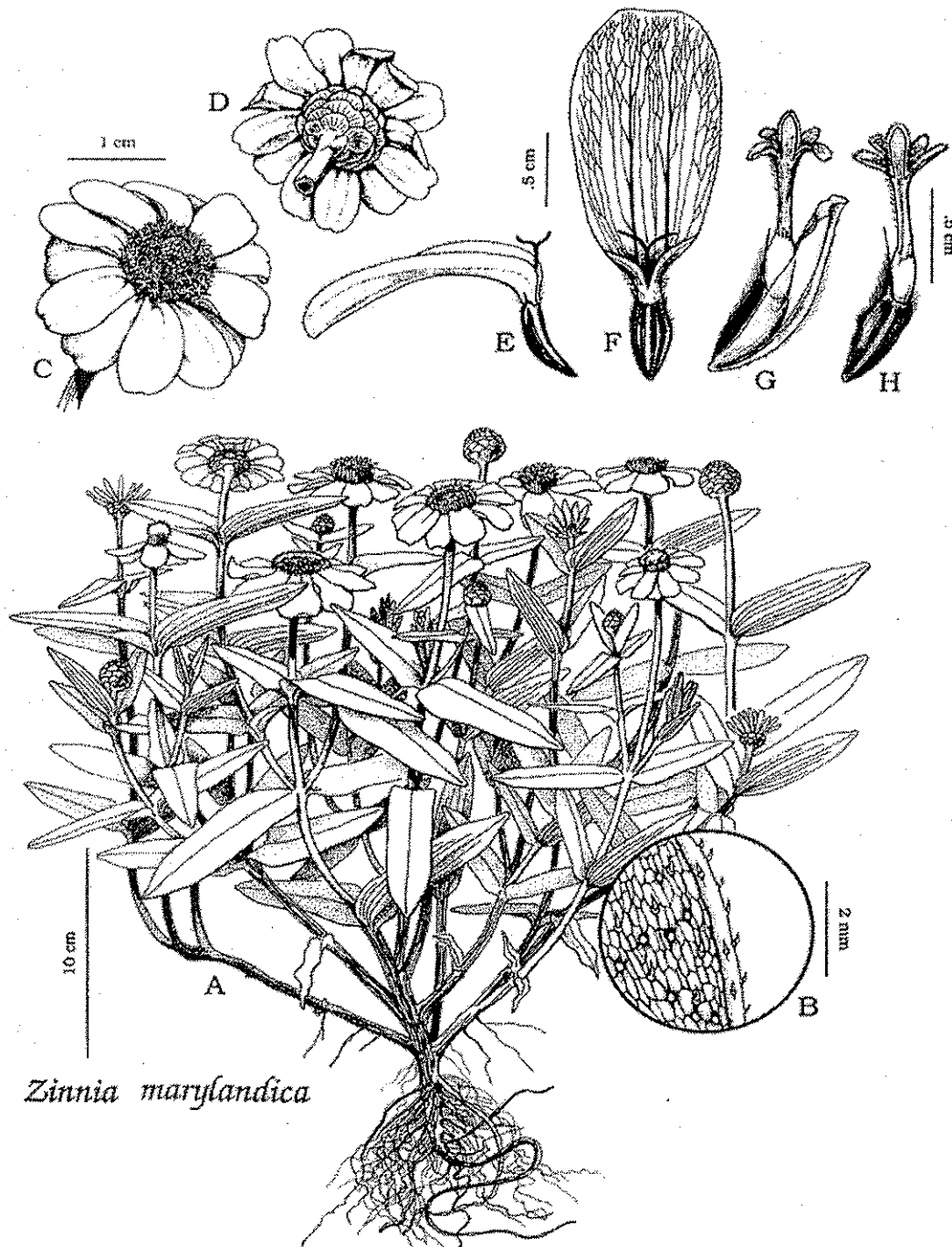


FIG. 1. *Zinnia marylandica*. A. Habit of plant. B. Abaxial leaf surface showing scabrous trichomes and sessile glands. C. Upper, and D. Lower view of a head. E. Side and F. Face view of ray achene. G. Disc floret and achene enclosed in pale. H. Disc floret and achene. (All from Stimart 1.)

pink, lavender, salmon, and burgundy ray florets (Boyle & Stimart, 1989), thus considerably broadening the flower color range. Full exploitation of the genetic variability within *Z. marylandica* by sexual recombination or asexual breeding techniques will probably extend the flower color range beyond that observed to date.

Evaluation of *Z. marylandica* seedlings in greenhouse and outdoor field trials has demonstrated that plants are highly ornamental and prolific in flowering. In addition, the seedlings exhibit high levels of resistance to *Alternaria zinniae* and *Erysiphe cichoracearum* and moderate to high levels of resistance to *Xanthomonas campestris* pv. *zinniae* (Terry-Lewandowski & Stimart, 1983). Unique combinations of flower color and plant habit have been obtained through interspecific hybridization, and *Z. marylandica* germplasm provides an expanded gene pool for development of ornamental characteristics not previously found in either parental species.

Acknowledgments

We thank Kandis Elliot for the artwork.

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE**EXHIBIT E**
STATEMENT OF THE BASIS OF OWNERSHIPApplication is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).
Per letter 7-14-08 LMC 2-12-08

1. NAME OF APPLICANT(S) Ball Horticultural Company	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER PAS White F8528M	3. VARIETY NAME 'PAS490444'
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) 622 Town Road West Chicago, IL 60185 USA	5. TELEPHONE (Include area code) (630) 588-3118	6. FAX (Include area code) (630) 562-7671
7. PVPO NUMBER		#200700334

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain.



YES



NO

9. Is the applicant (individual or company) a U.S. national or a U.S. based company? If no, give name of country.



YES



NO

10. Is the applicant the original owner?



YES



NO

If no, please answer one of the following:

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?



YES



NO

If no, give name of country

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?



YES



NO

If no, give name of country

11. Additional explanation on ownership (Trace ownership from original breeder to current owner. Use the reverse for extra space if needed):

The breeding of variety 'PAS490444' was conducted in Santa Paula, California at a Ball Horticultural Company facility. Other than greenhouse technical staff, the breeder, Peter Stefany, worked alone to develop this variety. He was and currently is an employee of Ball Horticultural Company. By agreement between the employee and Ball Horticultural Company, all rights and ownership to the variety resides with Ball Horticultural Company.

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 0.1 hour per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, D.C. 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

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**U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705**

**EXHIBIT F
DECLARATION REGARDING DEPOSIT**

per letter
7-14-08 LMC 8-10-08

NAME OF OWNER (S) Ball Horticultural Company	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) 622 Town Road West Chicago, IL 60185 USA	TEMPORARY OR EXPERIMENTAL DESIGNATION PAS White F8528M VARIETY NAME 'PAS490444'
NAME OF OWNER REPRESENTATIVE (S) Audrey Charles	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) 622 Town Road West Chicago, IL 60185 USA	FOR OFFICIAL USE ONLY PVPO NUMBER #200700334

I do hereby declare that during the life of the certificate a viable sample of propagating material of the subject variety will be deposited, and replenished as needed periodically, in a public repository in the United States in accordance with the regulations established by the Plant Variety Protection Office.

Audrey Charles
Signature

May 22, 2007
Date